REMARKS:

Claims 1-20 are in the case and presented for consideration.

The Examiner has rejected claims 1-13 and 15 -20 as being fully anticipated by U.S. Patent 5,993,613 to Manley.

For the reasons that will be presented below however, it is believed that the claims are patentably distinct over the cited reference. This is also believed true of claim 14 which the Examiner rejects as being fully anticipated, but based on a combination of Manley and U.S. Patent 5,026,471 to Latz et al., so that the issue of non-obviousness will also be discussed.

Although the claims have not been amended, if the Examiner feels that the language in the claims does not fully and adequately describe the invention as characterized below, and in the interest of reaching a conclusion to the prosecution of this case, the Examiner is respectfully urged and invited to call the undersigned with any suggestions he might have for improving the claims and reaching allowable subject matter.

It is believed that the rejection relies on a picking out of elements randomly from the prior art and combining them together without regarding their actual function and the claimed circuit arrangement. If a person of ordinary skilled in the art (e.g. an electronics R&D engineer) were to arrange an electronic circuit in the same manner, such a circuit would simply not work.

The configuration of U.S. Patent 5,993,613 to Manley was described in the present application at paragraph [0003] of its published version US2005/0098430 (i.e. DC-pulsed generator) and at paragraph [0005] (i.e. problems with protective measures for semiconductors). The configuration of U.S. Patent 5,026,471 to Latz was described at the application at paragraph [0003] (i.e. high frequency or HF being superimposed with respect to a DC basic discharge).

Discussing the secondary reference first, Latz teaches the superimposing of high frequency (HF) on a DC basic discharge with reactive sputtering which is an old and well known technique. The HF used is typically in the range of MHz, practically at 13.5 MHz. The HF forms an AC-signal typically as a sinusoid. In this way discharge instabilities should be avoided (see column 4, lines 10-21 and column 5, lines 1-3). The possibility of using the arrangement with pure HF-sputtering is also mentioned. An HF-sputtering arrangement means a completely different plasma discharge regime in comparison with DC-pulse and lower frequency discharges.

Nothing is disclosed in Latz about pulse sputtering and especially not a solution with a special pulse arrangement as in Manley and the present invention. The disclosure of Latz is a completely different technical principle and therefore cannot be compared or combined with Manley or the present invention in any meaningful way as contemplated by *KSR v. Teleflex,* which calls for at least some reason the combination can be made. As stated by the Supreme Court at page 16 of the slip decision in *KSR v. Teleflex*:

> "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for

combining the elements in the manner claimed."

The problems posed and disclosed solutions of Manley and Latz are different from each other.

The problems associated with reactive sputtering of insulating material is still, to the present day, difficult and longstanding. Neither with Latz nor with Manley is it possible to overcome these problems. The present application teaches and claims an appropriate and commercially well working solution that would not be expected from Manley alone, or Manley in combination with Latz.

Manley discloses a pulsed (modulated) DC power supply which produces unipolar DC-pulses (modulated) which operate the single sputter source intermittently (see Figs. 1, 4, 5 and 6 of Manley). The operation is in an alternating manner between an "active" state and a "quiescent" state. During the "quiescent" state the source is switched off and no material is sputtered from the cathode (see col. 4, lines 16-23 of Manley). The polarity of the DC-source terminal connected to the cathode (one cathode) is always the same.

Contrary to Manley, the claimed invention alternates the polarity at the electrodes in such a way that the electrodes are operated periodically alternating as cathode, and therefore sputter away material alternately from each electrode. This is not the case in Manley. In other words, and quoting the language at the end of Claim 1, neither Manley nor Latz functions:

"so that one electrode operates as a cathode while the other electrode operated as an anode in a periodically alternating fashion for inhibiting charges on surfaces of the electrodes caused by reversing of polarity at the electrodes and the creating of short circuiting of the electrodes during repeated zero crossings of the bipolar voltage."

In this regard, Claim 1 also calls for:

"the two connections of the secondary winding [of the transformer 14] being respectively and directly connected to the two electrodes [1 and 2 in Fig. 4] so that a bipolar voltage at the secondary winding of the transformer is transferred to the electrodes so that the electrodes operated with alternating polarity so that one electrode operates as a cathode while the other electrode operated as an anode in a periodically alternating fashion for inhibiting charges on surfaces of the electrodes caused by reversing of polarity at the electrodes and the creating of short circuiting of the electrodes during repeated zero crossings of the bipolar voltage."

The whole configuration shown in Fig. 6 of Manley forms the DC-DC converter which is mainly identical in function with the converter (7) of the claimed invention. The DC-output (+) and (-) shown in Fig. 6 corresponds to the DC-output of converter (7) in Fig. 4 of the present invention. This is a typical known converter arrangement as referred in the application describing the prior art and is well understood by those with ordinary skill in this art. Such a converter typically includes a bridge switching arrangement (94) with a transformer (100) stepping up and down the output voltage rectified by the rectifiers (102

to 105) and current smoothing inductors an capacitors (107 and 108). The pulsing (switching on and off) of the DC output is done within this converter arrangement of Fig. 6 in Manley, by controlling this primary switching bridge.

The claimed invention uses, up to this point, a similar converter (7) as in Manley in Fig. 6. But the invention uses in addition a “second” switching bridge (13) and a “second” inductor in the form of a transformer (14), for producing the alternating output polarity and proper decoupling of the two electrodes from the converter (7).

The arrangement is completely different.

The bridge and the transformer shown in Fig. 4 of the present invention, have a completely different function. For Manley to function like the arrangement of Claim 1, an additional bridge and transformer must be installed at the output of Fig. 6 in Manley (right side, + and -) in place of the mentioned polarity reversing circuit at the right (64).

Compare elements in the same way as the Examiner does, namely going out from transformer (14) as being identical with transformer (100) from Manley (which is clearly false), the invention does not have the same rectifier diodes (102-105), no inductor (107), no capacitor (108) and no polarity reversing circuit (64) between the secondary winding of the transformer (14) and the electrodes/sputter sources (2 and 3). This is a further difference over Manley which forms clearly defined bipolar pulse-shapes and amplitude to precisely control the reaction in the plasma process by alternating sputtering both of the electrodes.

In addition Manley is using semiconductor elements like rectifiers and

semiconductor switches (35) in the high voltage output lines for which those of ordinary skill in this art would knows is critical and needs special measures to protect them from being destroyed by plasma interference and high voltage transients. With the claimed arrangement of the invention, such problems are solved (see paragraph [0005] of the application).

Manley is using the afore mentioned separate polarity reversing circuit (64) as a further option for arc suppression (col. 11, line 65). As can be seen in Fig. 8 and the text the DC-polarity overall at the sputter cathode is not changed. This polarity reversing circuit is only operating during the “active” state of the DC-pulse and superimposed to this alone (Fig. 4, 5, column 5, esp. line 25). As shown in Fig. 5 the created superimposed pulse has a duration of 2 - 5 microseconds (20 - 80 kHz) and the “active” DC-pulse 0.5 - 10ms. The “quiescent” part of the DC - pulse has a duration of 0.5 - 50ms. This corresponds with a frequency of the DC - pulse of 1.0 kHz to 16.6 Hz. This switching of and on duration of the DC - pulse is very slowly and the superimposed pulse (86) is more fast. These fast superimposed pulse reach only a short time and with low amplitude in the positive tension V2 with respect to the large working area of the negative DC - pulse. The target (42) of the sputtering source can never work with inverse polarity as an anode especially not with the magnetron source disclosed in Fig. 3 which is using the typical magnetic electron trap in this type of source and therefore force the target (42) working with cathodic (negative) potential as every expert in this field would know. A pulse arrangement with bipolar pulse forcing two electrodes to alternate working as cathode is clearly not disclosed or suggest in Manley.

In connection with Claims 2 and 3:

Manley disclose a low power and low current arrangement (max. 15 KW, 71 Amp) whereas the invention is especially suited for high power of more than 50 KW, even several 100 KW with high current pulse [0027] with precise controllable pulse shape and without the problems of the already addressed defects in the equipment. This allows control of the preferred crystalline modification of deposited metal oxide films in a way which was not possible up to now.

The Examiner mentions an inductance value of 0.3 mH (milli - henry). This is related to the inductance of the inductor (107) and not to the leakage inductance of the transformer as defined in Claim 3. Furthermore in Claim 3 is claimed a value of below 50µH (micro - henry) which is two orders of magnitude lower. The person skilled in the art must supply this limitation on his or her own, with no teaching in the reference or reason in the prior art as a whole to reach Claim 3.

Manley teaches using a transformation ratio of 6:28 but not for a DC - DC converter arrangement (col. 13, line 47). It is important to have low ratios for the purpose of the invention in connection with the whole arrangement and be able to reach low leakage induction for the purpose of being able to produce high power pulses with defined shape as already explained.

Claims 4, 5, 7 and 8:

No bipolar pulse or timings are disclosed in Manley and the arrangement is completely different as already explained.

Manley does not disclose that the bridge must short circuit the primary of the

transformer during the pulse interspaces as defines in Claim 8. The Examiner attributes Manley as being able to achieve this but without any teaching in Manley to support this capacity. Besides, Manley is talking about turn off. Normally electronics engineers seek to avoid such shorts in a converter bridge, taking care not to overload semiconductors in the circuit. For this problem Manley even suggests using a current limiting choke (99) which clearly means no short circuit in the bridge or it is at least of minor importance.

Claim 6:

This is not the same arrangement as Manley discloses in Fig. 6 as already explained.

Claims 9-12:

Manley neither shows nor suggests such a configuration using more than one bridge together with the multiple transformer arrangement in this specific circuit arrangement and method which solves the specific task posed. There is believed to be no sound explanation for the assertion that Manley anticipated Claims 9-12 as contemplated by 35 U.S.C. 102.

Claims 15-20:

The invention is especially suited for depositing reactively deposited metal oxide layers and especially Aluminum-oxide, but in a very high quality never reached up to now. Many others have tried, including Manley, but were not successful with respect to the purity, the precise composition and defined crystal orientation (modification). It is believed

that the Examiner has not taken these new, unexpected and advantageous results into account.

Aluminum-oxide exists in several crystalline modifications. Sputter - deposited films were up to now namely present in a mixture of such modifications. It was not possible to control the process in a manner that it becomes possible to choose the desired type of modification. It is clear that such mixtures can be inherently of alpha and gamma phase as the Examiner states. But the Examiner simply ignores the phrase "at least one of." The invention allows now to produce pure alpha or gamma or mixtures of it as desired. It is not a question of coincidence anymore which modification can be reached, as was the case in the prior art.

Claim 14:

Latz was commented on above. In addition, in combining Manley with Latz it was not explained where or how the mentioned "second" target (33) of Latz would be connected to the circuit of Manley, based only on the teaching of these references and without hindsight gained from first reading the present application. The combination does not teach for what such a second target would be for, nor how it is to operate. It is especially not disclosed in the prior art to operate a second target alternatively as anode and as cathode.

According, claims 2-20 are believed to be novel and unobvious over Manley taken alone or in combination with Latz and the application and claims are believed to be in condition for allowance.

Favorable action is respectfully requested.

No new matter has been added since each of the claim limitations can be found in the specification as filed.

As requested above, if any issues remain, the Examiner is respectfully invited to contact the undersigned at the number below, to advance the application to allowance.

Respectfully submitted,

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